

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 063 204 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
21.08.2002 Bulletin 2002/34

(51) Int Cl.7: C03C 27/08, B29C 65/14,
B01J 19/00, B01L 3/00,
G05D 7/00, B01F 1/00

(43) Date of publication A2:
27.12.2000 Bulletin 2000/52

(21) Application number: 00305206.5

(22) Date of filing: 20.06.2000

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

- McCreedy, Thomas
Hessle, HU13 9QD (GB)
- Wilson, Natalie Gayle
Hull, HU5 3HN (GB)
- Skelton, Victoria
Hull, HU5 3SG (GB)
- Nelstrop, Lorna Jane
Hull, HU6 7LS (GB)

(30) Priority: 21.06.1999 GB 9914493

(71) Applicant: Micro Chemical Systems Limited
Hull HU1 4BG (GB)

(74) Representative: Knott, Stephen Gilbert et al
MATHISEN, MACARA & CO.
The Coach House
6-8 Swakeleys Road
Ickenham Uxbridge UB10 8BZ (GB)

(72) Inventors:
• Haswell, Stephen John
Cottingham, HU16 4RL (GB)
• Greenway, Gillian Mary
Beverley Road, South Cave. (GB)

(54) Chemical devices, methods of manufacturing and of using chemical devices

(57) A method of manufacturing a chemical device comprises, providing a first member (10) with a surface portion and a groove (18,20) located at the surface portion, and a second member (14) with a surface portion (16). A coating (34) which may be metallic or organic is provided on either the surface portion of the first or second member. The coating (34) is heated by combined convective heating and microwave irradiation. For a metallic coating (34) the heated coating bonds to the surface portion of the second member (14) so as to close the groove (18,20) to form a channel. For an organic coating the coating heats the surface portions of the two members to a temperature suitable to cause thermal connections. The organic coating then vaporises allowing the surface portions to contact and undergo thermal connection.

A method of controlling hydrostatic and diffusion based flow of a liquid in a chemical device and a method of preparing a working solution of a desired concentration in a chemical device are also described.

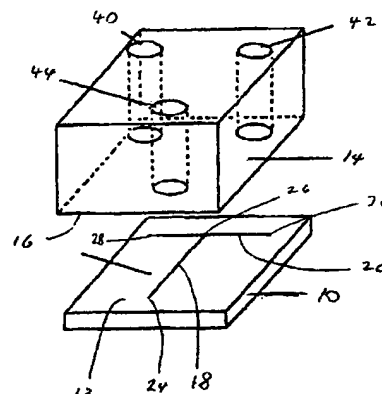


Figure 1

EP 1 063 204 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 5206

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 98 45693 A (SOANE DAVID S ;SOANE ZOYA M (US); ACLARA BIOSCIENCES (US); AMIGO M) 15 October 1998 (1998-10-15)	1-4, 7-11, 13-15, 18,19	C03C27/08 B29C65/14 B01J19/00 B01L3/00 G05D7/00 B01F1/00
Y	* page 8, paragraph 2 * * page 8, line 18 - line 19 * * page 8, line 24 * * page 10, line 12 - line 20; figures 1-6 *	5,6,12, 16,17	
Y	EP 0 635 737 A (LUCAS IND PLC) 25 January 1995 (1995-01-25) * claims 1,13 *	5,6,12, 16,17	
A	WO 99 29497 A (CALIPER TECHN CORP) 17 June 1999 (1999-06-17) * claims 13-15,33 *	3,12,14, 16,20	
A	WO 97 36965 A (LAMBDA TECHNOLOGIES INC ;FATHI ZAKARYAE (US); WEI JIANGHUA (US); G) 9 October 1997 (1997-10-09) * page 14, line 25 - line 26 * * page 16, line 35 - line 36 *	1,3,5,7, 14	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B01J B01L C03C G01N B29C B01F
A	FR 2 681 388 A (PHILIPS COMPOSANTS) 19 March 1993 (1993-03-19) * claim 1 *	1,5,16, 17	
A	EP 0 705 682 A (FRAUNHOFER GES FORSCHUNG) 10 April 1996 (1996-04-10) * claim 1 *	1	
X,P	WO 00 30606 A (SCHWERIONENFORSCH GMBH) 2 June 2000 (2000-06-02) * page 4, paragraph 1; figure *	22-25	
-/-			
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 May 2002	Examiner Hocquet, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



European Patent
Office

Application Number

EP 00 30 5206

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 5206

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (InCL.7)
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) - & JP 11 010184 A (EE DOUBLE ENG:KK), 19 January 1999 (1999-01-19) * abstract; figures 1,2 *	22-25	
A	WO 99 26724 A (ADAMS CHRISTOPHER P ; MOSAIC TECHNOLOGIES (US); MUIR ANDREW R (US);) 3 June 1999 (1999-06-03) * page 26, line 2 - line 21 *	22	
A	WO 98 00231 A (BOUSSE LUC J ; CALIPER TECHN CORP (US); KOPF SILL ANNE R (US); PARC) 8 January 1998 (1998-01-08) * page 47, line 6 - line 8 * * page 47, line 29 - line 32; figure 12E * * page 58, line 12 - line 14 *	22	
X	US 4 625 543 A (ERTL STEFAN ET AL) 2 December 1986 (1986-12-02)	33-42	
Y	* column 1, line 54 - line 63 * * column 3, line 47 - line 30 * * column 5, line 3 - line 7 *	43	TECHNICAL FIELDS SEARCHED (InCL.7)
Y	WO 97 00442 A (UNIV WASHINGTON) 3 January 1997 (1997-01-03) * page 3, line 1 - line 5 * * page 28, line 6 - line 12 *	43	
X	US 5 181 533 A (KOOI RICK F) 26 January 1993 (1993-01-26)	33,34, 36-39	
X	* column 1, line 66 * * column 3, line 45 - line 50; claims 1,5; figures 6,7 *	40	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 May 2002	Examiner Hocquet, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P/04C01)



European Patent
Office

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 00 30 5206

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-21

A method of manufacturing a chemical device and chemical device

2. Claims: 22-32

A method of controlling liquid movement in a chemical device.

3. Claims: 33-43

A method of preparing a working solution of a substance at a desired concentration in a chemical device



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 5206

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 759 907 A (KAWOLICS RICHARD J ET AL) 26 July 1988 (1988-07-26) * column 2, line 5 - line 14 * * column 6, line 11 - line 28 *	33,34	
X	US 5 312 756 A (JOLLY CLIFFORD D) 17 May 1994 (1994-05-17) * column 4, line 40 - line 45 * * column 5, line 33 - line 37 *	33,34,41	
A	EP 0 430 248 A (MOCHIDA PHARM CO LTD) 5 June 1991 (1991-06-05) * page 11, line 14 - page 13, line 8; figures 6-8,17,18 *	43	
A	US 5 869 004 A (KOPF-SILL ANNE R ET AL) 9 February 1999 (1999-02-09) * column 3, line 53 - column 4, line 20 * * column 8, line 38 - column 9, line 15 * * column 10, line 51 - line 64 *	43	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 May 2002	Examiner Hocquet, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 5206

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-05-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 9845693	A	15-10-1998	US	6054034 A	25-04-2000
			US	6176962 B1	23-01-2001
			AU	7101698 A	30-10-1998
			EP	1015878 A1	05-07-2000
			JP	2001519907 T	23-10-2001
			WO	9845693 A1	15-10-1998
EP 0635737	A	25-01-1995	EP	0635737 A1	25-01-1995
			JP	7077612 A	20-03-1995
WO 9929497	A	17-06-1999	US	6074725 A	13-06-2000
			AU	1534799 A	28-06-1999
			EP	1039995 A1	04-10-2000
			WO	9929497 A1	17-06-1999
WO 9736965	A	09-10-1997	US	6312548 B1	06-11-2001
			AU	2539597 A	22-10-1997
			WO	9736965 A1	09-10-1997
FR 2681388	A	19-03-1993	FR	2681388 A1	19-03-1993
EP 0705682	A	10-04-1996	DE	4435887 A1	11-04-1996
			DE	4447521 A1	11-04-1996
			EP	0705682 A1	10-04-1996
			JP	8224782 A	03-09-1996
WO 0030606	A	02-06-2000	DE	19853286 A1	25-05-2000
			WO	0030606 A1	02-06-2000
			EP	1148869 A1	31-10-2001
JP 11010184	A	19-01-1999	JP	2995208 B2	27-12-1999
WO 9926724	A	03-06-1999	AU	1597599 A	15-06-1999
			CA	2311501 A1	03-06-1999
			EP	1034040 A2	13-09-2000
			WO	9926724 A2	03-06-1999
			US	6251660 B1	26-06-2001
WO 9800231	A	08-01-1998	US	5942443 A	24-08-1999
			US	6046056 A	04-04-2000
			AU	729537 B2	01-02-2001
			AU	3499097 A	21-01-1998
			BR	9710054 A	11-01-2000
			CA	2258489 A1	08-01-1998
			CN	1262629 A	09-08-2000
			EP	1145760 A2	17-10-2001

EPO FORM P0439

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 5206

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-05-2002

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9800231	A		EP 0907412 A1	14-04-1999
			JP 2001502790 T	27-02-2001
			NZ 333346 A	27-03-2000
			US 6274337 B1	14-08-2001
			WO 9800231 A1	08-01-1998
			US 6306659 B1	23-10-2001
			US 6150180 A	21-11-2000
			US 6267858 B1	31-07-2001
			US 2002039751 A1	04-04-2002
			US 2002031821 A1	14-03-2002
US 4625543	A	02-12-1986	CH 663667 A5	31-12-1987
			AT 47230 T	15-10-1989
			AU 583039 B2	20-04-1989
			AU 4200485 A	23-01-1986
			DE 3573660 D1	16-11-1989
			DK 294085 A ,B,	19-01-1986
			EP 0168551 A2	22-01-1986
			JP 1721125 C	24-12-1992
			JP 4007942 B	13-02-1992
			JP 61030744 A	13-02-1986
WO 9700442	A	03-01-1997	AU 6541596 A	15-01-1997
			CA 2222126 A1	03-01-1997
			EP 0839318 A1	06-05-1998
			JP 11508182 T	21-07-1999
			WO 9700442 A1	03-01-1997
			US 5932100 A	03-08-1999
US 5181533	A	26-01-1993	NONE	
US 4759907	A	26-07-1988	NONE	
US 5312756	A	17-05-1994	NONE	
EP 0430248	A	05-06-1991	AU 642444 B2	21-10-1993
			AU 6702690 A	06-06-1991
			CA 2031001 A1	31-05-1991
			EP 0430248 A2	05-06-1991
			3223674 A	02-10-1991
			5147607 A	15-09-1992
US 5869004	A	09-02-1999	J 732462 B2	26-04-2001
			U 8255198 A	30-12-1998
			P 0988110 A1	29-03-2000
			O 9856505 A1	17-12-1998

EPO FORM P0459 For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 5206

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-05-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5869004 A		US 6004515 A	21-12-1999
		US 6149870 A	21-11-2000

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82